MAY 1980

DRIVER

GET IN GEAR
GET IT ON

DRIVERSCOPE

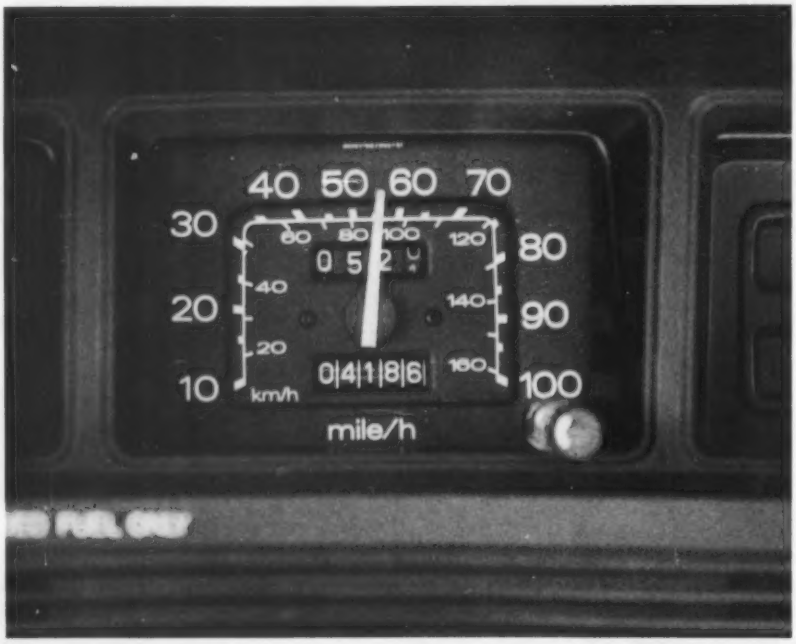
A MAZE YOURSELF

safe speed

DRIVER

This is Jean-Claude Killer, the greatest living French Grand Prix driver . . . or at least that's what he told us.

Le et La SAFE SPEED



Here is the speedometer. They still read higher than 55, but there is very little reason for the extra numbers when above 55 is illegal. Memorize this position on *your* speedometer.

Allo; I am Jean-Claude Killer, driving to see someone I care for very much. Or perhaps I should say "Spee-ding," or "speeding," as you Americans say. I have been asked by the editors of your DRIVER Magazine to give you the benefit of my knowledge of speeding. You see, I am the greatest living French Grand Prix driver, and for six years in a row I had the record for the most speeding citations from the Paris gendarmes, until I came to America to make commercials.

However, the people at DRIVER Magazine have asked me to give you the negative aspects of speeding, because they would like to discourage the practice. I have agreed, especially after they offered me the recipe for something called "Pseudo-Texican Chili."

And what are these negative aspects? They are the expenses of speeding—citations, which cost money; accidents,

Try driving at exactly 55 sometime. You'll be amazed at how many drivers leave you *far* behind. Jean-Claude tried it here, and he got a good view of *everyone's* taillights.

which cost lives; and the depletion of the nation's oil supply, which costs the entire nation in money and in independence from foreign oil suppliers.

Tickets: As I said, there are the citations, or tickets. Speeding is illegal – every street and highway here in the United States has its "speed limit," and to go faster than these limits will result in a ticket if you are caught. My experience shows that many times you *will* be caught; not always, but enough times to make it expensive for you. Not only is speeding expensive in dollars, it could also result in the authorities taking your license away. And in America, being without a car is almost equivalent to "solitary confinement."

I have read that the Surface Transportation Assistance Act of 1978 required states to have at least a 30 percent compliance with the 55 mph speed limit during 1979; any state that failed to reach this level would lose five percent of its federal highway funds. And the required compliance must increase by 10 percent each year, to reach 70 percent in 1983, or states will face up to a 10 percent loss of highway funds.

I bring this up because I expect this will mean the authorities will become even more eager to stop speeders when it means money out of their state's pockets. Therefore speeding will become even more expensive.

But before I go on, I would like to explain a few things about speed limits.

Optimum theory: This is the theory behind speed limits: The posted speed limit is designed as the law for the maximum speed in optimum conditions. That is, the speed on dry roads, with good visibility and with a good traffic spread (and, I might add, in daylight hours). Anything that limits these conditions lowers the maximum *safe* speed, no matter what the posted speed limit may be. These limitations might be visibility (rain, fog, dust or the like), road surface (paved or unpaved, as well as water, ice, gravel and such), and road condition (holes, patches). A motorist might be ticketed for "speed too fast for conditions" even though he was traveling below the legal *posted* limit.

The traffic spread will limit your speed in other ways. In heavy traffic, you cannot expect to travel much above or below what everyone else is traveling. To vary the speed too much would invite an accident. That is why many people avoid being on the road at what you call your "rush hour" – they have no real control of their speed because it is determined by the speed of the other cars.

I hope you noted my remark above about daylight. Yes, I did mean to suggest that your speed should be lower at night. Driving at night is something we all must do at times, and our ability to see is limited by darkness. Therefore we must slow down accordingly. (See "How Well Do You See After Dark," December 1979 DRIVER, for a discussion of the hazards of nighttime driving.)

Speed limits are given for the safety of all the users of the streets – the bicyclists, motorcyclists and pedestrians, as well as the auto drivers. A sign in a school zone might say "40 mph," and in small letters "25 mph when children are present." The chances of children crossing present a special case requiring a lower limit.

Similarly, speed limits in hospital areas will be lower. Business areas, residential areas, alleyways, even parking lots will have their own speed limits, designed for the safety of the citizens. It is wise to contact the law enforcement authorities in your area to get a "driver's handbook," which will have this and other useful information.

You might wonder why it is necessary to have a limit on the highways in America when the vehicles allowed to travel on them are limited to those capable of higher speeds (no bicycles or mopeds, and in certain cases, no motorcycles). Many have argued for the abolition of a maximum speed limit, as is the case on some highways in Germany, or at least a return to the higher limits of a few years ago.

But the limit on American highways remains 55 mph, and for good reasons. The limit was put into effect as an effort to conserve gasoline in the mid-1970s when Arab oil shipments to the U.S. were embargoed for a time. But it is also true that there are many more automobiles on the road in the U.S. than in Europe, and that increases the chances of accidents. Lower speed limits reduce those chances.

Minimal speed: An interesting fact is that on some highways in the United States there are posted *minimum* speeds. To go below these speeds means that you are impeding the flow of traffic, and could get a ticket. You might see the sign "Speed limit 55, 40 minimum." That is the usual gap, 15 miles per hour. You have doubtless

continued

THE EDITOR SPEAKS DOUBLE CLUTCH

THE MAIL

One of the most interesting aspects of publishing a magazine is the mail from readers. Sometimes the staff comes up with what we consider a world-beater—an article or photo spread with absolutely everything for everybody. What happens? A couple of postcards trickle in, a few people phone, maybe a letter from a traffic safety specialist turns up. But that flood of mail we expected doesn't always materialize.

Then again, the reverse is true. Stacks of letters arrive on a subject we thought you might find ho-hum but that actually set you thinking.

Of course, like every other publication, DRIVER gets a lot of mail when we say something readers don't like or believe is wrong. We did just that in this column in February. The subject was a favorable comparison between the use of fuel in motor sports and the use for pro football, baseball, recreational boating and recreational flying. Trouble is, we said "private flying" without repeating that word "recreational." Consequently, a lot of you wrote in to tell us that private planes do everything from crop-dusting to cargo-hauling and contribute significantly to the national economy. Right. We were speaking of pleasure flying and should have specifically said so.

To all of you who have taken the time to write us, not just with criticism but with questions for Double Tech, comments about your personal adventures with cars, motorcycles and bicycles, stories about seat-belt saves, and hundreds of other subjects, thank you. Keep those cards and letters coming! Unless you've been in this business yourself, you'll never know how important they are to us.

MAY

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encountered drivers who were traveling five or ten miles per hour slower than yourself, and you felt they were barely crawling down the road. So you can see that anyone moving more than 15 mph slower would certainly interfere with the free movement of traffic.

But back to the "costs of speeding."

Accidents: A question that is of interest is "What is the relationship between speeding and accidents?" The Texas Department of Public Safety reports that 26 percent of fatal accidents in that state are the result of speeding. The National Safety Council's data for 1978 for the whole country shows: 16.9 percent of all accidents involved speeding (including "speed too fast for conditions"); 20.8% of accidents that resulted in injuries involved speeding; and *32.3 percent of all accidents with fatalities involved speeding.*

That is a third of the fatal accidents. The percentage is much too high to be written off to an accidental correlation.

Let us look at it another way. It has been said that one's chances of surviving a crash at 55 miles per hour are 33 to one, and that at 70, the chances fall to less than even. While this may be true, it sounds like an oddsmaker in Monte Carlo has computed one's chances to live. Perhaps a bit distasteful.

I prefer to look at the speed issue on a more personal level, in terms of reaction times of the driver and the automobile. The driver's reaction time upon seeing an emergency situation is three-quarters of one second. (This includes a perception lag, recognizing the danger and making a decision on action. A fuller examination of this is contained in "Seeing . . . Being Seen," February 1980 DRIVER.) This ¾ of a second will remain constant. Some (race drivers such as myself and others) may be a bit faster and some may be a bit slower, but the range is only between one-half second and one second.

This is the culprit, your right foot. Maybe it's a lack of coordination between the eye, which sees a speed limit sign, and the foot, which just thinks "faster, faster."

The difference comes in the time (and distance) it takes to stop the automobile. (See the chart I have provided on stopping distances. However, a caution is in order here: This chart is meant only as a general representation of the stopping distances, an aid to illustrate a point, not as an accurate guide. Some cars will stop in shorter distances; some, sadly, will take longer.) At 55 mph, the car in the example will stop in a total of about 225 feet, with a reaction-time distance of 60 feet and a braking distance of 165 feet. At 70 mph, the reaction-time distance is 77 feet, not much greater than the distance at 55 mph, but the breaking distance is 304 feet, almost twice the braking distance for 55 mph.

What all this means is that slower speeds give you much more time to react, and more space in which to do your reacting.

STOPPING DISTANCES FOR PASSENGER CARS
under normal, dry and level road conditions

MPH	REACTION TIME DISTANCE*	BRAKING DISTANCE	TOTAL FEET
10	11 feet	9 feet	20
20	22 feet	23 feet	45
25	27 feet	34 feet	61
30	33 feet	45 feet	78
35	38 feet	67 feet	105
40	44 feet	81 feet	125
45	49 feet	110 feet	159
50	55 feet	133 feet	188
55	60 feet	165 feet	225
60	66 feet	206 feet	272
65	71 feet	231 feet	302
70	77 feet	304 feet	381

*Distance car travels in ¾ of a second.

This chart shows *approximate* distances it takes to bring a passenger car to a full stop from various speeds. The chart is purely illustrative; it is presented to make a point. Because of the many factors involved in braking it is not possible to create a chart that covers all possible situations.

Two seconds? Consider this: In your traffic safety journals, you are often reminded to observe a "two-second rule." This states that you should follow another car so that it passes a stationary object at least two seconds before you do. This gives you adequate room to stop if the car ahead does. The traffic safety experts say this rule will allow you enough room to stop, no matter what your speed.

At 55 mph, your car travels about 80 feet every second. This makes the distance traveled in two seconds 160 feet. When was the last time you saw anybody allowing 160 feet between

continued

him and the car ahead? It is likely that if anybody did, someone else would change lanes and move into that space. Yet, that 160 feet is what it takes to maintain safety. At 70 mph (102 feet per second), the two-second rule would require a following distance of over 200 feet.

Do you begin to see the wisdom of slower speeds?

Gasoline: And how is speed related to economy? Simply that the faster you go, the more fuel your automobile consumes. The car gets its best fuel economy at between 30 and 40 miles per hour. This is fine in the city, where many streets are posted with 35 mph limits, but one cannot go this slowly on the American multi-lane highways.

However, the point I am trying to make is that miles-per-gallon drops drastically above 40 mph. The car uses 21 percent more gasoline at 70 mph than it does at 55. It has been estimated that over five billion gallons of gasoline would be saved each year if all Americans would hold their speed to 55.

Not all speeders drive cars like this one . . .

(right)
Some drive cars like this one . . . or perhaps like yours?

And 55 is not that slow. Try this: The next time you are traveling on a highway with a 55 mph speed limit, travel at *exactly* that speed (if you do not already). You will notice several things. First, many people will pass you at much higher speeds. Second, you will arrive at your destination later, but not very much later. Third, you will find that you had a more relaxing drive. Perhaps this last change is because you will not be worried about being stopped by the police.

The police have a programmed reaction to speeding. It is called a "speeding ticket," and if you accumulate enough of them, their reaction becomes "license suspension."

Averages: A question you may be asking is "What is the average speed on American highways?" The National Safety Council says, based on data from the Federal Highway Administration, that the average speed rose from 56 mph in early 1977 to 56.3 mph in late 1978. The Highway Users Federation says the average speed in 1979 was 55.8 miles per hour.

My perception is that it must be higher, at least in some areas. In late 1978, I was traveling across the country on my way to California for some

continued

Le Conditional Speeding

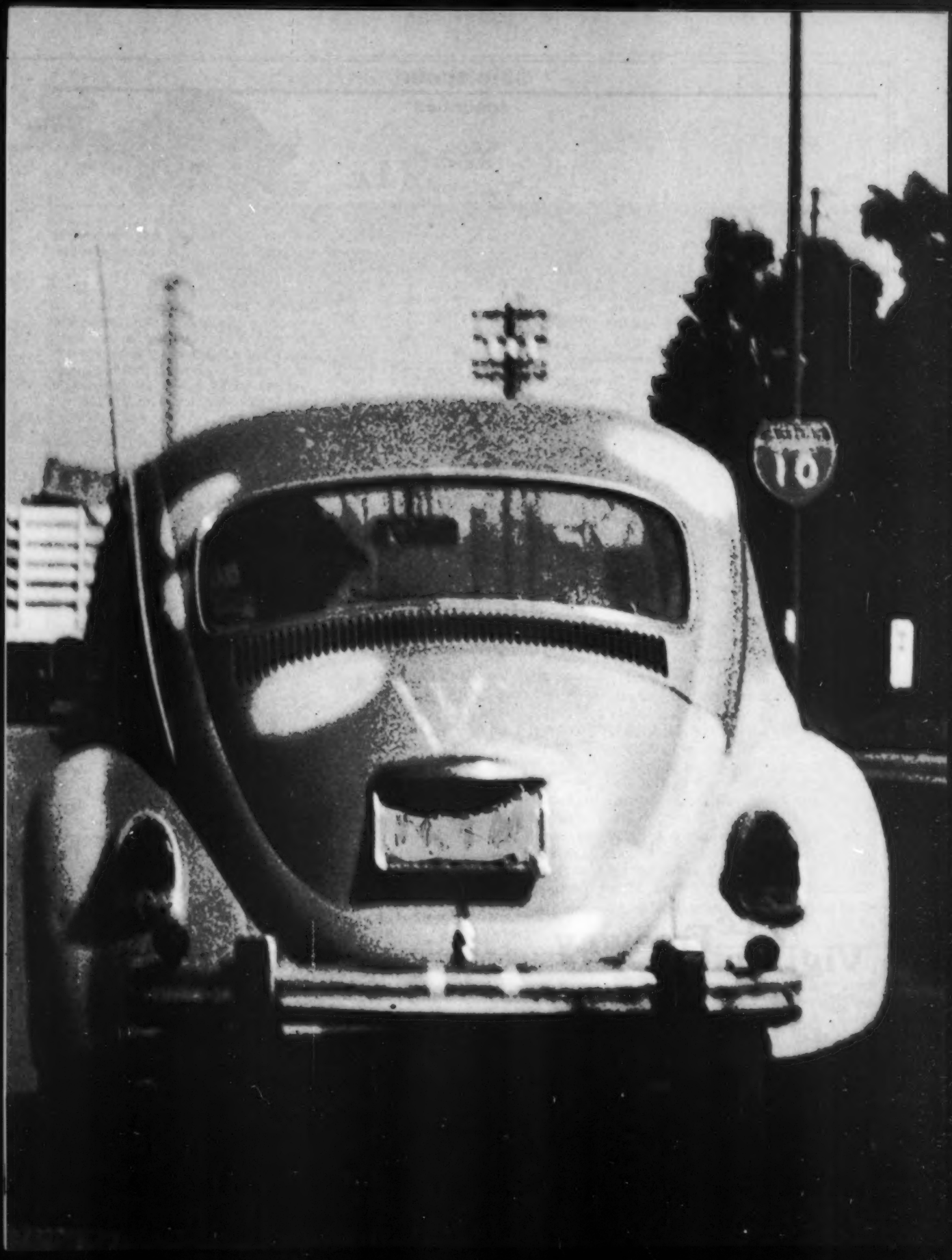
Jean-Claude threw a few statistics at you about "speed too fast for conditions." Among these, he said speeding was a factor in 32.3 percent of all accidents with fatalities.

Let's look at that phrase, "speed too fast for conditions." What is meant by those words? The police mean the conditions of road surface and visibility. Thus, if the speed limit is 45 mph, you shouldn't go that fast when, say, the road is icy or if the visibility is hampered by blowing dust. All that makes sense.

But let's take it a little further and expand on the definition of "too fast for conditions." What about the conditions of the car you're driving? Does it have bad shocks? Wouldn't that be a "condition" that would make it wise to move more slowly? Or maybe bald tires? Or brakes that have been acting up lately?

How about *your* condition? If you're tired and your reflexes are slow, wouldn't you be advised to slow down (if indeed you *have* to drive)? If you're drunk, of course, you're in no condition to drive at *any* speed. But what if you're pre-occupied with something else?

What we're trying to say is this: In 1978, 51,500 people died from traffic accidents. One third of that number, *16,000 to 17,000 people*, died from an accident involving speed too fast for road or visibility conditions. How many more of those 51,500 people may have died from speeding too fast for *other* conditions?


10

Year of Le Turtle

commercial work. I had been convinced, by highway policemen in several states, that traveling at 55 miles per hour was prudent. However, upon reaching California, I discovered an entirely different world. Speeds rapidly picked up and cars were going past me at as much as 10 mph faster, a sensation with which I am unfamiliar. I decided to "go with the flow" as you say, and I accelerated to match them. I am sure most of you have had this experience no matter what your area in the United States.

Who speeds? According to the Highway Users Federation, most Americans do. Their figures show *54 percent* of U.S. motorists violated the 55 limit in 1979. The state with the lowest percentage of speeders was Virginia, with 28 percent. Texas, at the other end of the scale, had 72.5 percent speeders.

Surveys: Yet, many surveys have been conducted that conclude the nation supports the 55 mph speed limit. A Gallup poll once reported that 73 percent of the U.S. support it; a survey of American Automobile Association members showed 69 percent in favor—but 72 percent felt most people violate the law. Obviously, this is true.

But why? Why do they "pay lip service" to the idea of the 55 mph speed limit, but turn around and violate it on a regular basis? If you talk to them, they will say "Yes, all that information makes sense. I think 55 is a good idea." But put them in their cars, and they think differently. "It takes too long to get anywhere when you drive that slow!" "Basically I support 55, but I have to be (wherever) at (whenever), so I'll go faster just this once." "Nobody else drives 55; why should I?" It is rather like saying you support one candidate but going to the polls on election day and voting for the candidate of the other party.

Safe: What is a safe speed? In some sense that depends on what vehicle you are driving. Your National Highway Traffic Safety Administration recently tested 33 foreign and American passenger cars for their ability to protect occupants in head-on crashes of 35 miles per hour. Only nine of them passed the test, and these were all American cars.

However, we do not want to think in terms of accidents, but in terms of *avoidance* of accidents. A safe speed is any speed that allows you ample space around you to stop or avoid any danger that presents itself. A safe speed is any speed that is slow enough to allow you to maintain complete control of the car, given the condition of the road, and that allows you a safety margin if that surface changes (rough spots, puddles . . .).

A safe speed is probably slower than you think it is.

The Chinese have a special calendar. On it, they give names to the years—"Year of the Horse," "Year of the Ox," things like that. This year is the "Year of the Monkey" for them. However, we would like to declare this year the "Year of the Turtle" for driving purposes.

The poor turtle gets laughed at because he's so slow, but he has a good motto: "Slow and steady wins the race." He proved that one in his race against the rabbit in the old fable.

That motto is rather appropriate for us because we are in a sort of race. We are in a race against oil supplies. They are running out, and we are madly (and finally) trying to conserve before they *do* run out. The best way we have to conserve presently is to be more moderate in our speed.

1980 will be over in about seven months, and we need symbols for the next few years after that. Snails and inchworms don't thrill us, but how about the "Year of the Owl," for that old symbol of wisdom? (You won't see *him* breaking the sound barrier like his cousin, the hawk.) That's okay for '81, and we'll keep thinking . . .

But back to the turtle. We like him for another reason: He's a pretty good example of crash-resistance in engineering!

Le Freeway Vigilante

We asked our offensive driving expert and local speed-freak, Turk Wrench, for his comments on speeding. For once, he had something constructive to say.

"I tell you, it's getting so a guy can't take a drive without some bozo taking the law into his own hands and trying to run you off the road. It's enough to turn you into a conscientious objector, or whatever you'd call the motoring version of a non-combatant. Almost, but not quite.

"Here's the story: A few days ago, I was tooling down the state highway at maybe 70 mph or so. Traffic was moderate, except in the left lane, *my* lane, which the law-abiders had decided to keep clear. Nice of 'em.

"Suddenly some creep in the middle lane moved into my lane. He was going barely 50; 53 at the outside. I saw him

Speeding is not the only cause of the depletion of the supply of gasoline, but it helps. Nobody wants a return to the gas lines of '79. (No, we can't believe the prices, either!)

glance over his shoulder—he saw me, I could tell. I saw something else, too. A kind of self-satisfied look, like 'Now I've got you, you son-of-a-truck-driver!'

"Nowhere for me to go—cars in the right lane, pillars for an overpass coming up on the left. I put my foot, leg, hip and whole *back* into the brake pedal, but it wasn't enough. I hit the little creep square in the tail. We got stopped okay, somehow. His little econocrackerbox looked like a mashed prune and his head looked like I'd done a dance on it—which I wanted to. Despite the gash on his forehead, I think he was pleased with himself—no kidding!

"He was, until he realized he'd just trashed his means of transportation and my pickup was barely dented, being equipped with a reasonable facsimile of a loading dock for a front bumper. *And* until he realized that the staters would be giving only him a ticket, which they did, for taking the right of way. Witnesses saw the thing, and they backed me up on my story.

"The point of this is, as hostility editor of DRIVER, I thought I should tell you not to mess with offensive drivers, be they just ordinary speeders or the noisy horn-blowing type.

"Don't try to be a vigilante; you'll be the ultimate loser."

get into gear ....get it on

Courtesy of the
Motorcycle Safety Foundation

You may be a novice rider or an experienced motorcyclist . . . or just a passenger; but you know already that motorcycle riders are not as well protected as automobile drivers who are wrapped in a strong steel compartment.

You probably also know that motorcyclists are exposed to the elements – weather, dirt, road debris. For this reason, the wise motorcyclist gets into gear – protective gear for safety and comfort – by wearing clothing appropriate for motorcycle riding.

Come on, let's get going. Up through all the gears. Get it on!

First gear: The helmet: Wearing a helmet when riding a motorcycle is common sense. Accident studies indicate that states not having helmet laws have higher motorcycle fatality rates due to head injuries than states having such laws. You should wear a helmet even if the law does not require it.

As the old punch-line goes, "If you have a $10 head, wear a $10 helmet." Select a helmet with as much care as buying a motorcycle. The helmet is the most important piece of personal equipment for safe riding. Helmets vary widely in style and protection.

Helmets that offer the most protection will meet U.S. Department of Transportation or Safety Helmet Council of America standards.

For both comfort and protection, your helmet should fit snugly but not tightly. Avoid the helmet that fits too loosely or that interferes with your visibility. Remember to fasten the chin strap securely – a loose helmet is no protection.

The helmet can also serve to make you more visible to other highway users when you affix reflectorized tape to the sides and back of the helmet. Some states require such reflectorization.

A special word about custom painting: some helmets are made of materials which will lose their protective strength when painted. Gasoline may also break down the protective qualities of a helmet's construction when coming into contact with the inner shell.

A final word: most helmets are good for one impact only. Replace your hel-

met after an impact such as an accidental fall. It has done its job. Second-hand helmets are questionable bargains.

Second gear: Eye protection: Most states require eye protection. You must be able to see clearly to ride safely. Personal preference for face shield or goggles will determine which type of eye protection you wear.

Both face shield and goggles will protect your eyes against dirt, insects, water, or small stones which might interfere with your visibility. These devices will also reduce eye fatigue brought on by squinting.

Be sure that the protective device for your eyes is made of shatter-proof material and is free from scratches which may distort your vision. Good ventilation is necessary to prevent fogging.

Whether you wear face shield or goggles, the lenses should be clear. Tinted lenses substantially reduce vision at night. Sunglasses can be worn under a face shield to avoid eye fatigue during daylight hours.

Remember: regular eyeglasses were never meant to be eye protection on a motorcycle.

Third gear: Footwear: Sturdy leather boots which rise over the ankle are the best footwear for riding. Boots which have rubber soles for better grip of the pavement and heels which help keep your feet on the pegs are recommended. Lace-up boots offer substantially more ankle support than do boots with zippers or slip-ons.

Fourth gear: Gloves: When you wear leather gloves for riding, you are not only protecting your hands, but also improving your grip on the handlebars. Gloves will prevent your hands from growing cold, tired, and sore. Gloves should fit snugly, but not too tightly. Gloves that have too much bulk will reduce your ability to operate hand controls.

The style of the gloves you choose to wear will have a significant effect on your ability to operate your motorcycle. Seamless palms will help prevent blisters; gauntlets will keep cold air from going up the sleeves. By adding strips of reflectorized tape to your gloves, you will also make it easier for motorists to spot you in traffic.

Fifth Gear: Clothing: Long-sleeved jacket and long pants are minimal clothing requirements for good riding protection. For fair weather, riding apparel made of strong, durable materials such as denim or corduroy should be selected. In cold weather, experienced riders prefer the qualities of leather clothes. You will also find clothing lines now appearing with nylon as the basic material backed up by light padding.

Avoid loose floppy clothing such as wide flared pants and long scarves which might become entangled in the motorcycle's machinery.

Your clothing should fit comfortably without binding. A jacket with a zippered front will be more wind-resistant than a jacket with buttons or snaps. Be careful about the collar style also—a large, loose collar will flap strongly when you're riding and may irritate your skin or be a distraction. Jackets with snug cuffs and waist are recommended to keep wind from blowing into the garment.

Remember that even in relatively warm weather, constant exposure to wind when riding may reduce body temperature. A condition known as hypothermia can cause you to lose your ability to concentrate and react properly to changing traffic conditions. Motorcyclists are especially susceptible to rapid chilling leading to loss of reflexes, a sympton of hypothermia. The biggest danger of the subnormal body temperature found in hypothermia is the deterioration in the ability to think clearly. Proper riding gear such as wind-proof clothing and insulated layers of clothing is essential for safe motorcycling.

As a matter of comfort, special rain gear is available for inclement weather conditions. Such rain gear has tight-fitting cuffs and pant legs to keep out wind and water. You can also wear slip-on rubber boots to keep riding boots dry.

As with helmets and gloves, the clothes you wear when riding can also serve to make you more visible in traffic. Choose bright-colored clothing when possible. If you wear dark clothing, inexpensive reflective vests can be worn over the jacket. Also, you may choose to affix reflectorized tape striping to garments you regularly wear when riding.

By getting into gear—protective riding gear—before you ride, you are demonstrating a responsible attitude toward safe motorcycling. For comfort and protection, be sure your helmet and other gear meet the characteristics of good, protective, personal equipment outlined on these pages. Good riding gear is essential to safe motorcycle operation.

....get it ON

PART 2

After we read the Motorcycle Safety Foundation's (MSF) article on riding gear, we decided to take a look at what's available. So we picked up Kay, a young novice rider, and went to a local motorcycle shop to help her pick out what she needed.

If you haven't visited your friendly neighborhood cycle store lately, go in and look around. Please—let's see no more T-shirted and bare-headed riders!

Choose a motorcycle shop like we did, with a good assortment of bright-colored jackets . . .

continued

. . . leather clothing . . . and, of course, motorcycle helmets.

The salesperson, Margo, shows Kay a leather motorcycle jacket. Although expensive, this provides the optimum protection against the wind—and against scrapes in an accident.

The sleeves have zippers for a snugger, more air-tight fit.

". . . And she was the terror of Highway 101." The leather clothes and high motorcycle boots are excellent safety gear. For cold-weather riding, there's no substitute.

The leather jacket is tempting, but Kay decides to look at something a little less expensive and, most importantly, brightly colored. The jacket on the right is gray with reflective stripes on the sleeves; the one she's wearing is bright yellow.

Gloves are a must, for protection against the wind. It can get pretty cold riding at 50 mph with bare hands.

(right)
Maybe a little too sky-diverish . . .

(below)
For wet weather gear, why not look at a water-proof rain suit?

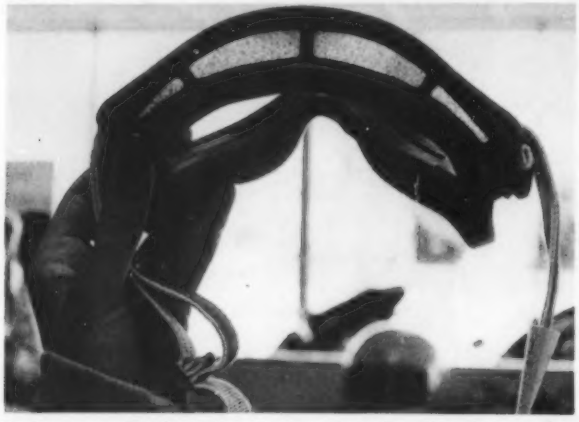
Our silent friend here has done as much as he can to protect his own hide by covering himself head-to-toe in cowhide.

The full-face helmet offers the best protection for your head. It is also the most expensive kind of helmet, but how valuable is your head?

continued

She may look like an astronaut, but this full-face helmet would guard her face and head in an accident.

Margo shows Kay the assortment of goggles that are available.



These goggles have foam inserts that allow the air in, to keep them from fogging up.

Snap-on face shields can be either clear or tinted. The tinted ones are good for bright, sunny days, but they reduce night vision. The clear ones are good for all situations, and you can wear sunglasses under the helmet for sunny days.

This is the reason you want a helmet that fits well. A too-large helmet can slip over your eyes, even with the chin strap fastened.

A smaller helmet with a face shield fits Kay's needs, and budget, a little closer.

This is the way we buckle the helmet strap.

(right)
Kay goes with the blue helmet (which just happens to match her bike), clear face shield, yellow jacket and gloves.

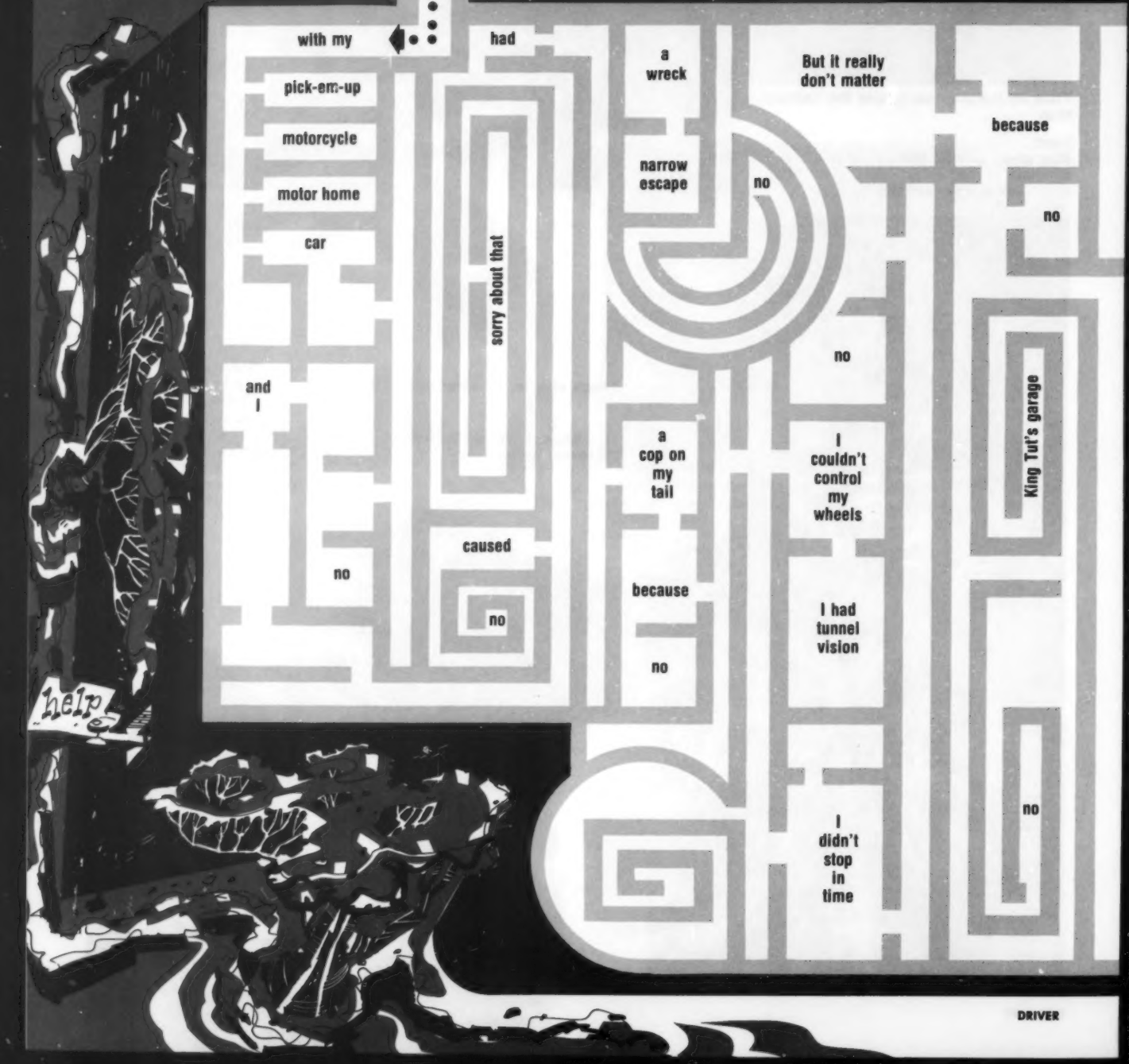
There she is, all suited-up and ready to ride . . .

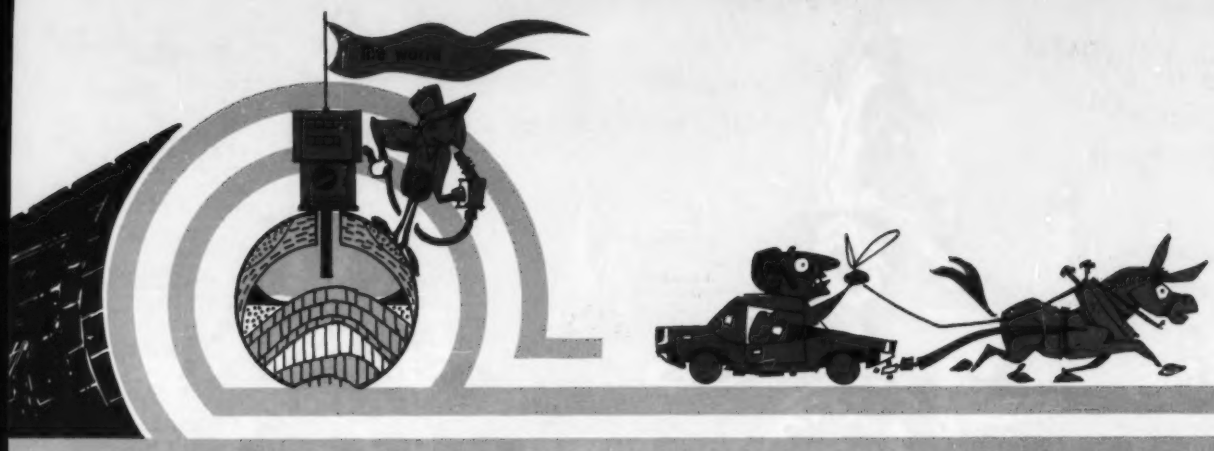
. . . except (below) for one thing—*wear* the helmet, please.

We want to thank Dale's Modern Cycle in San Bernardino, Calif., for their assistance with the photos for this article.

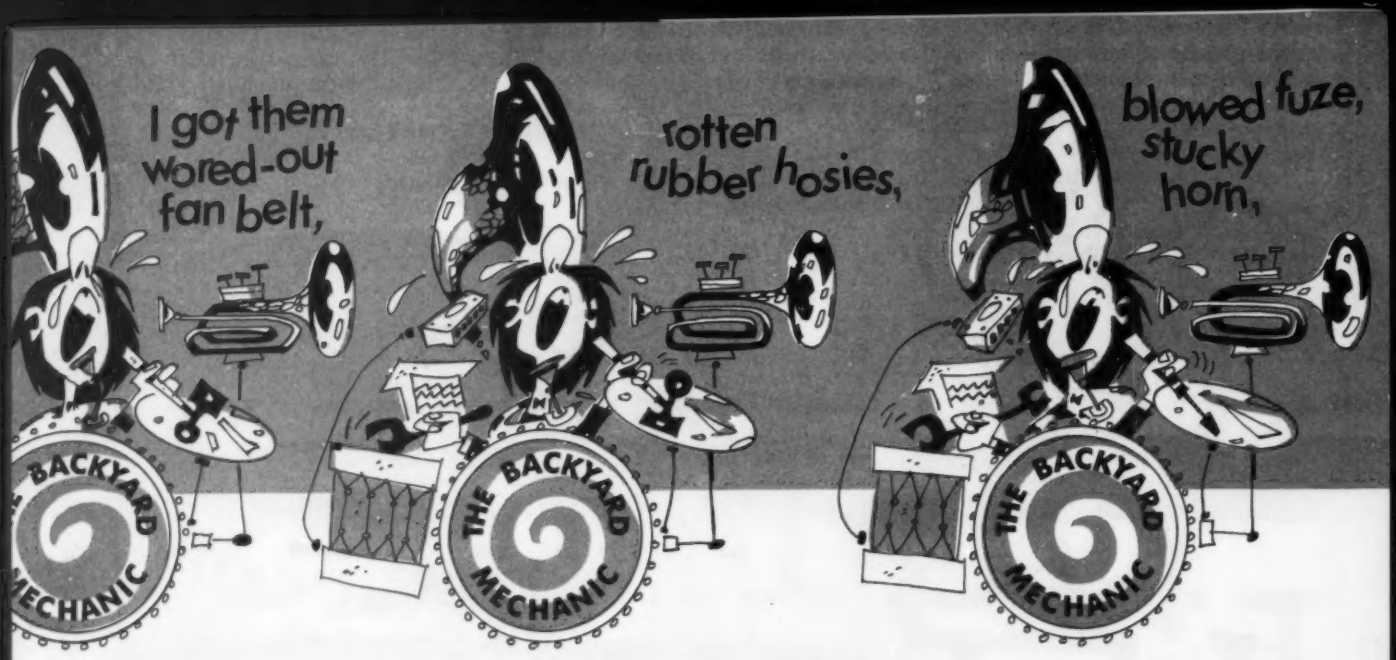
A maze yourself!
Find the hidden message

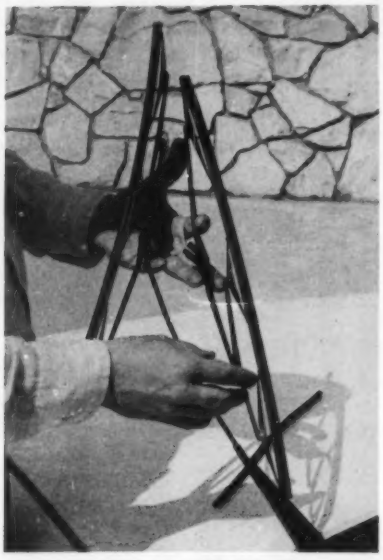
"I was drivin' faster than 55"





sad
sorry
cryin'
better off
you'll be
because
You'll get the lawyer's bill
You'll never get credit again
no
But
you'll still have to make the payments
I've run out of gas
I'm goin' to jail
I didn't have a license
no
because
anyway
and I'll
but
a new set of wheels
I wasted
who really cares
bail
no
gas
no
the
last gallon
never be able to afford
no
King Tut's other garage
of gasoline in





(left) **Off with the old,** on with the new. Wiper blade refills usually slide off and on with ease provided care is taken to align the ribs in the holders. (right) **Whole blades** may have to be replaced which is usually easier than it sounds, especially with the complete instructions found on most replacement blade boxes.

More often than not the little problems can get an individual down. Small problems that make operating a motor vehicle difficult or less than safe are the worst. Adding frustration to the minor maintenance blues is the disappearance of the friendly corner full-service gas station – the place where in by-gone days the employees were actually happy to see customers.

What's even more disappointing about these tiny troubles is eventually seeing how easily they could have been solved.

As the obvious isn't obvious to everybody, here are a few pointers to take some of the anxiety out of the annoying trivial troubles and clear the way for safe motoring.

Older wiper blades that don't completely squeeze the water off the windshield leave streaks behind that are hard to see through or around. They must be replaced. On most vehicles replacement is very easy once the correct length refill blade has been purchased. The correct length can be determined by either measuring the blade already on the vehicle or consulting a chart usually found with the blades on the sales shelf. In most cases the box containing the refills explains installation completely.

The refill is the rubber portion of the blade. It usually has a metal rib although some refills require removing the rib from the blade already on the car to be used with the refill. Make sure this rib is straight. If it is bent or damaged, the blade won't make good contact with the glass and may smear worse than the original. The rib slides through four or more "C"-like holders on the blade and is held in place by a spring-action lock at the end of the rib. Once you have located this spring-action lock on the old blade, squeeze it on both sides and slide the old blade out of the "C" holders. Then simply slide the refill back into the holders making sure the "C"s grip each side of the rib in the track on the refill. When slid its full length, the blade should automatically lock into place.

On those blades where the old rib must be reused, there is seldom a spring-action lock. Instead the "C" holders run in a groove below the metal rib. Be sure to note where the rib is located along with where the "C"s grip before removing the old blade. The groove that the "C" holders grip ends in an upward slant with a solid section of rubber between the main slot and a grip-lock niche. Removing the old

blade requires a good yank to get the "C" out of the niche. It then slides out just like other blades. The ribs (in this case there is ususally one for each side) are then moved to the refill. Make sure the ribs are straight and don't get bent during reinstallation. Once the ribs are in place, the refill can be slid back into the "C" holders. Again, a final pull to get the "C" to lock into the niche is more of a yank than a slide.

With older vehicles there are times when replacing the refill isn't enough. As with the refills, complete blade replacement is simple once the correct size blade is found. Again, the new blade box usually has very complete, detailed instructions. This is especially true since most replacement blades must be adapted to fit the mount with hardware included in the box.

There are several types of fittings for the blades and arms. One is a pin lock where a small rod with a spring-style locking device slides into the blade. Another is bayonet-style with the blade sliding on and off a flat piece of metal that usually has a small ball-like locking mount. There is also a hook that attaches over a rounded end on the arm.

Caution must be exercised so as not to bend the arm while removing and installing new blades. The arm provides most of the tension that keeps the blade in full contact with the glass.

Always make sure the blade and refill are attached firmly before operating the wipers. If either comes off during operation, the scratches left in the windshield are deep and very permanent. In other words, it's time to lay out nearly $200 for new safety glass.

Equally easy to solve is the problem of a burned-out turn indicator or brake light bulb. Usually all that is needed is a screwdriver and, of course, the new bulb. Other times just the new bulb is enough.

Most parking light/turn indicators are behind lenses held in place by two screws. Back the screws out and remove the lens. Grasp the bulb firmly, push in on it and at the same time turn it counterclockwise. It should then pop out. Line up the small metal probes of the new bulb with the slots in the housing, push the bulb in and turn it clockwise. It should lock into place. Before replacing the lens, check to make sure the new bulb is working.

It should be easy to understand how to replace a broken lens from the above instructions.

In other cases, the bulb and its mounting simply plug into the housing, as is the case with many side marker lights and tail/brake lights. Grasp the housing from inside the body panel or trunk, and pop it out of the housing. Remove and replace the bulb as before, and push the entire assembly back into place.

Still other bulbs are held in assemblies that must first be unbolted from a panel, slid back, and then removed and replaced.

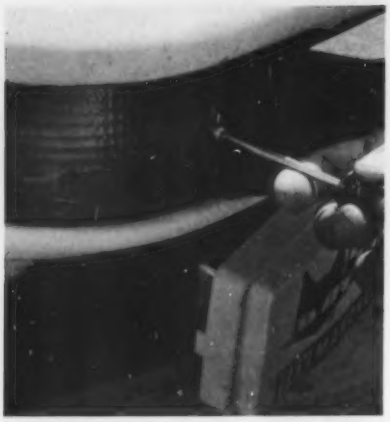
Headlight replacement was explained fully in the February 1980 DRIVER. Basically, the headlight body molding is removed via a few sheet metal screws—after the cover on concealed headlights is locked open or removed, if required. Then the retaining ring screws and retaining ring are removed. At that point the headlight can be carefully pulled and unplugged. Aligning the tabs on the replacement lamp with the slots in the adjusting assembly, the new light is plugged in and held in place with the retaining ring. After adjusting the light's aim, the molding is replaced, along with the cover if there was one.

Hoses are among those nastier items that are always failing at the worst possible times—like when crossing the desert. That's why they should be checked anytime the hood is opened. Squeeze the hoses. If they are spongy, collapse or don't spring back from finger pressure, replace them. If the hoses are cracked, split or show signs of leaking, replace them. Hard hoses may leak at connections; replace them.

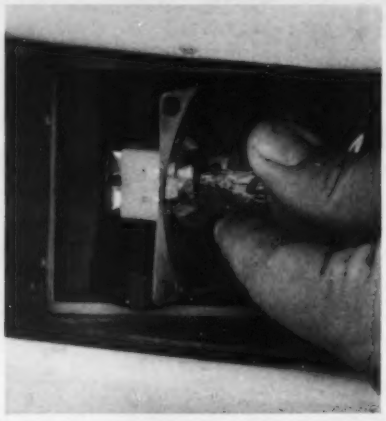
Are the clamps in good condition? Don't know? Then replace them anyway.

The replacement hose must have the correct internal diameter. It's always nice if the hose is the proper length—fighting to get a hose that is too long to bend without crimping off the fluid flow is not fun. Of course, if it is a straight connection, cutting a hose that is too long can be done; stretching one that is too short can't. If the hose to be replaced is premolded, buy one to match—use the old hose as a

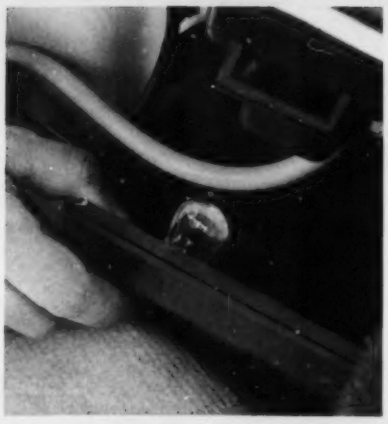
continued



To get to a turn signal bulb normally requires only removing a couple of screws, then popping off the lens.



Firmly grasp the bulb, push it back slightly and turn it counterclockwise. The new bulb is then pushed in and turned clockwise.



Some bulbs are hidden behind panels that must be unbolted from the body before the bulb can be popped out.

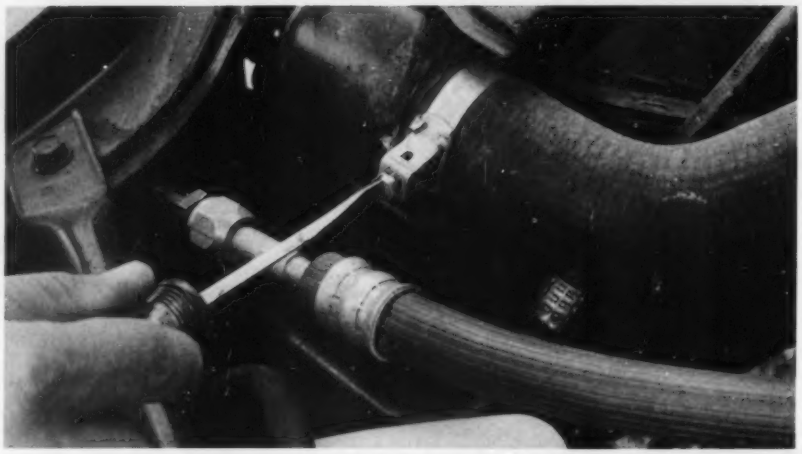
pattern if necessary. As a general rule don't use flexible-type hose. While it bends to fit easier, it may cause air pockets which can lead to overheating problems.

As with the hoses, there are a variety of clamps. Most require only a screwdriver to remove and install. However, there are many wire-style clamps that make Backyard Mechanics wish for special pliers. The wire-style clamps have to have their ends squeezed together at the same time they are being eased away from the connection. Using pliers designed for the job makes it simple. Without the special pliers, removal and installation is never fun. Those backyard mechanics who plan ahead always replace the wire-style clamps with band clamps long before there is trouble. Remember, the wider the band, the longer it will hold tight.

Always allow the system to cool down before starting to work on any hoses. Never begin working on the cooling system until you can safely open the radiator cap. Burns are painful.

When replacing an upper radiator hose, drain enough coolant from the system to prevent loss. With lower radiator hoses, the entire system will have to be drained. There is a petcock at the bottom of the radiator for this.

Loosen the hose clamps and remove the old hose. Clean the connection necks with a wire brush. Place two clamps on the replacement hose, mov-



Screw-type hose bands are easy to install and remove while providing a larger grip area than wire clamps.

Belts are adjusted after loosening the nuts and bolts located at a fixed pivot point and along a slotted groove.

ing them to the center. Slip one end of the hose onto the engine connection, then the other end onto the radiator connection. After having moved the hose as far onto the engine connection as it will go, tighten the clamp. Do the same thing with the radiator connection.

After bringing the radiator level up to par with the correct ratio of water and anti-freeze, start the engine and check for leaks. Retighten the clamps after the system has warmed up.

Sometimes a replacement hose isn't going to be available when needed. In that case, once the system has cooled down tape the hose as completely as possible and hope it holds back the flow long enough to get to a replacement. Wrap the tape completely around the hoses starting several inches forward of the leaking area and going several inches beyond.

Belts rank right up there with hoses in the trouble rank-structure. In fact, it is hard to tell which one outranks the other. Belts transfer rotary power from the engine's crank to the alternator or generator, water pump, air conditioning, power steering pump and air pump. When the belt goes, that system it turned is out, too.

Belts that are frayed or cracked should be replaced. And in order for a belt to run the system it is transferring power to it must be properly tightened. Proper tension usually translates into about 3/16- to 3/8-inch that the belt can be depressed midway between the pulleys.

Belt removal and replacement happen to involve the same steps as belt tension adjustment. Most of the systems driven by belts are mounted with bolts. At least one of the bolts is in a fixed location while another is located within a slotted area. Loosen the first bolt just enough that when the nut and bolt in the slotted area are loosened the system can be forced to move. But keep the bolts and nuts tight enough that the unit does not flop about. A pry bar is used to move the unit until the proper tension is obtained and to hold the unit in that position until the nut and bolt in the slotted area can be tightened. Likewise, the unit is moved far enough so that the belt can be slipped off and on for replacement.

With so many systems being belt-operated it is often necessary to remove several belts to get to the one that needs replacement. In these cases it is important to remember which system is driven off which pulley valley. This is necessary to ensure the belts run correctly aligned. Otherwise, wear is accelerated.

Fluid level checks have been made easier by the use of plastic reservoirs that allow viewing the fluid without opening. It should go without saying that fluids must be kept above the minimum mark and below the maximum mark. It is always advisable to consult the owner's manual to ensure that all the fluid levels have been checked. Among the fluids to be checked are: engine oil, radiator coolant, transmission oil or automatic transmission fluid, brake fluid, power steering fluid, rear axle grease, battery water and windshield washer fluid.

Engine oil and automatic transmission fluid are usually checked with dipsticks with engine oil being added through a cap on the valve cover while ATF is usually added through the opening the dipstick came out of. Be sure to check the manual for the exact method required to check ATF.

The closed system radiator with overflow is easy to check without concern for getting burned. Never, never open a hot radiator cap. Not only is there a good chance of getting burned by gushing coolant, but also much of the vital fluid is lost in the process. If there are no "min/max" lines on the inside of the radiator, the water should always be visible above the core even when cold, but be below the neck.

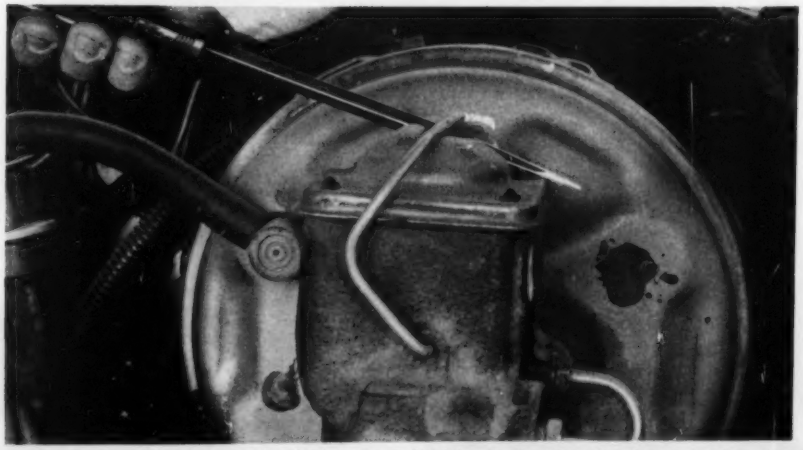
Although lack of windshield washer fluid won't keep a car from moving, the vehicle can be driven with more peace of mind when the front window is clean and there is fluid available to maintain that clear view.

A healthy battery means the power to start a vehicle. It also provides the means of warning other motorists of an emergency – electricity to run the flashers. Battery water levels are similar to radiator coolant levels if there are no "min/max" marks: above the plates, but below the notch in the filler neck. Those lifetime or carefree batteries also require checking. They usually have a built-in signaling system.

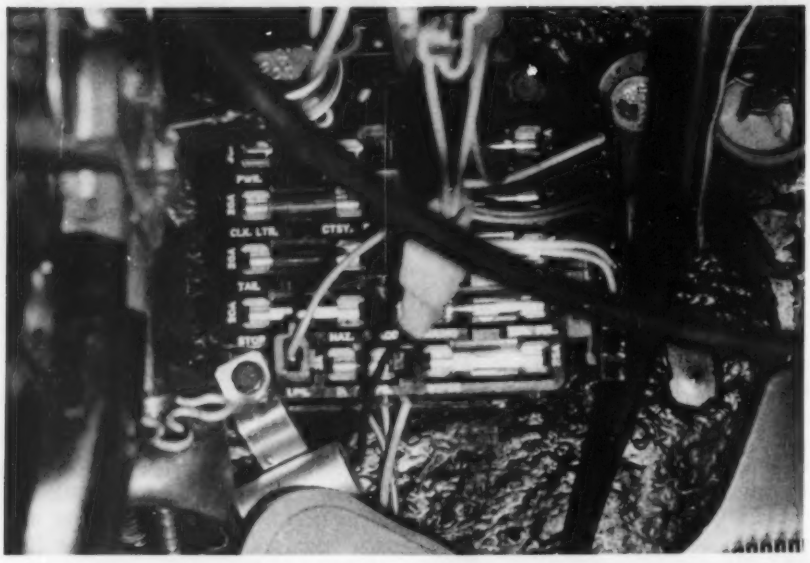
Even brake reservoirs are see-through today. Some even have easy-opening screw-on caps. The other method of access is via a cap held in place with a bent wire. This wire is forced off with a screw driver or similar tool.

While under the hood checking all these levels, why not find the horn? It is normally mounted as far forward

continued



Brake reservoir caps can be lifted to check fluid levels after the wire clamps holding them in place are pried off.



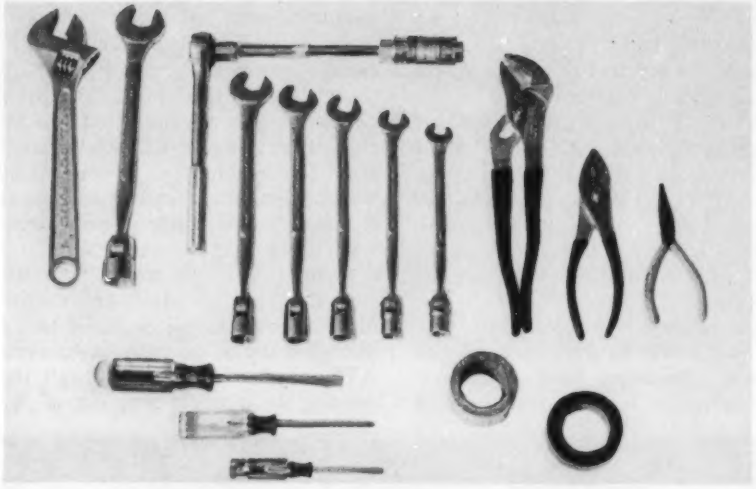
Fuse boxes are seldom located in easy-to-get-to areas.

in the system as possible, such as in front of the radiator but behind the grille. Knowing where it is will make stopping the noise quicker should it ever stick. (It surprises many people how difficult the horn is to locate when it is making its loud noises.) To stop a stuck horn, simply unplug the lead wires – they just pull off.

Sometimes when an electrical item on the vehicle stops, a blown fuse can be the problem. It is always nice to know where the fuse box is before any trouble starts, so locate it now before it's really necessary. As a general rule, the fuse box is seldom conveniently located or easy to get at.

Before replacing a fuse, turn all electrical components off. Also turn the ignition off and remove the key. Turn the fuse between its contact springs until the metal strip is easy to see. If the metal strip is separated, the fuse is blown. If a fuse puller isn't available, a wood match makes a good

Pull the wire away from the connection and the horn stops blowing.



This is a reasonable set of emergency repair tools, but there is very little duct or electrician's tape left on those rolls.

(right)
Oil filter, oil, spout, plugs, radiator cap, 2x4, coveralls and a small section of plastic are other items that come in handy at the roadside.

tool for removing the blown fuse.

Carefully install a new fuse of the correct amperage. Installing a fuse of greater capacity than specified may damage the unit the fuse is intended to protect. Even more hazardous than an overrated fuse is the use of foil or wire across the circuit.

Remember that a burned fuse usually indicates an overload in the system. Therefore, it is not sufficient to merely replace the fuse. The cause of the overload must be found and corrected as soon as possible. There are usually five things that cause an electrical problem: a bad unit, a poor connection, defective wiring, defective switch or a bad fuse.

To do any minor maintenance or emergency repairs there are certain tools that should always be in the vehicle. These include pliers, screwdrivers (both slotted and Phillips), an adjustable wrench or two, a plug wrench, and a set of combination open and box-end wrenches. In addition there should also be a roll of electrician's tape; duct tape and bailing wire are also very helpful.

It is always nice to have a set of coveralls to change into so that the rented tuxedo doesn't end up with grease all over it—nothing ever goes wrong except when it can least be afforded. In addition to the coveralls, a plastic drop cloth is handy, as are leather working gloves, a can of hand cleaner and a clean rag.

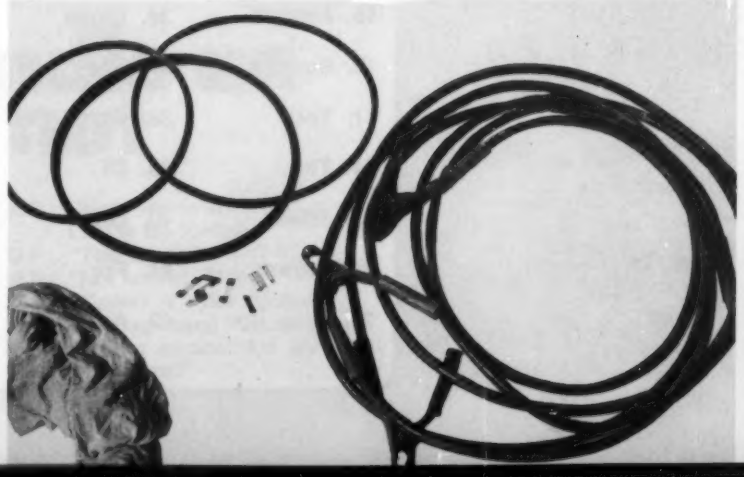
Now we all know that all our vehicles have emergency kits that include flares or warning triangles, a first-aid kit and matches, don't we? Well, the car itself may need some emergency first-aid. This is especially true if it is driven across country, into remote areas or is of an unusual breed.

In the car's emergency repair kit might be points, condenser, rotor and a spark plug or two or four or six or eight or twelve for you Ferrari and Jaguar owners. Other items include at least a quart of oil (and something to pour it with) and maybe a spare filter and fuel pump for those really rare breeds. In addition, carry parts that the car has had a past appetite for such as radiator caps, fan belts, gaskets, etc. Dealer service managers can often provide information on what certain vehicles tend to break most often.

Jumper cables and a variety of spare fuses are always needed. Another simple aid is a 2x4 block of wood. It's not surprising to find that the jack lacks a ½-inch of getting enough height to get an inflated tire on the hub that the flat just came off of. Brake fluid and radiator sealant along with coolant are also good peace-of-mind extras.

Of course the best peace of mind comes with a vehicle that has proper preventive maintenance. That's what The Backyard Mechanic is all about. Stay tuned.

A few more flares would be nice, but maybe there are too many wiper blades in this group of spares. The leather gloves, hand cleaner, first-aid kit, matches and brake fluid should be common to all vehicles. The emergency belt in the lower left-hand corner can be cut to fit any need. That spare valve cover gasket set looks like it has seen better days.



The jumper cables, spare fuses and rag should be found in all vehicles while the spare fan belts all fit different items on the same vehicle.

DRIVERscope

Salutations, stargazers! (Translation: "Hi, horoscope fans!") We have consulted the heavenly bodies (and a few old fortune cookies) and we have developed an Automotive Astrological Guide. Just find your sign, if you can, and find the proper words out of those listed here.

HARRY'S (or Hairies), the **RAM** (Mar 21-Apr 19): 1, 7, 22, 34, 53, 63, 77.

BORIS, the **BULL** (Apr 20-May 20): 11, 20, 33, 45, 50, 78.

HIM AND I, the **TWINS** (May 21-Jun 20): 12, 17, 36, 57, 68.

DANCER, the **CRAB** (Jun 21-Jul 22): 15, 30, 42, 51, 67.

B.O., the **LION** (Jul 23-Aug 22): 8, 31, 44, 49, 58, 62, 79.

HERGO, the **VIRGIN** (Aug 23-Sep 22): 3, 18, 27, 39, 43, 61, 72, 76.

ZEBRA, the **SCALES** (Sep 23-Oct 22): 9, 28, 35, 41, 56, 65, 75.

SCORE-3-0, the **SCORPION** (Oct 23-Nov 21): 10, 19, 29, 46, 55, 69, 80.

SATCHELCARRYUS, the **ARCHER** (Nov 22-Dec 21): 2, 13, 26, 37, 48, 60, 74, 81.

COPPERCOIN, the **GOAT** (Dec 22-Jan 19): 4, 14, 23, 38, 54, 70, 71.

AQUARIUM, the **WATER CARRIER** (Jan 20-Feb 18): 6, 21, 25, 32, 40, 52, 59, 66, 73.

HIGH-SEAS, the **FISH** (Feb 19-Mar 20): 5, 16, 24, 47, 64.

(With apologies to Clay R. Polian)

CAR GAZER

1. Many	22. Have	43. Way	64. Braking
2. Be	23. Night	44. Signal	65. Wheeled
3. Give	24. And	45. Slick	66. Of
4. Drive	25. Slower	46. 55	67. Passenger
5. Practice	26. Behind	47. Slow	68. Disaster
6. Pass	27. Right	48. Wheel	69. Are
7. People	28. Be	49 Your	70. You're
8. Remember	29. Above	50. Road	71. Room
9. Always	30. Makes	51. Poor	72. To
10. Don't	31. To	52. With	73. Rested
11. Drive	32. Car	53. Saved	74. All
12. Following	33. On	54. When	75. Vehicles
13. Alert	34. Been	55. Tickets	76. Others
14. At	35. Watching	56. Two	77. Seatbelts
15. Alcohol	36. Close	57. Invites	78. Surfaces
16. Smooth	37. The	58. Intentions	79. Others
17. Too	38. Only	59. Plenty	80. Expensive
18. The	39. Of	60. At	81. Times
19. Speed	40. Only	61. Away	
20. Slower	41. For	62. To	
21. A	42. A	63. By	

how to handle an astrology nut

Horoscope Person: "What's your sign?"

DRIVER Person: (looks at sign he is leaning on) "'Hospital Zone,' why?"

H.P.: "No, your sign in the *horoscope*."

D.P.: "Like on a submarine?"

H.P.: "Not periscope, *horoscope*. Like in the Zodiac."

D.P.: "That's a bear, isn't it?"

H.P.: "Not kodiak, *Zodiac*!"

D.P.: "Kodiak is a film company."

H.P.: (walking away) "Oh, forget it."

D.P.: "Wait a minute! Are my slides developed?"

Not long ago, my dentist took an hour of his valuable time (for which I was charged) to explain to me why it was important to make flossing my teeth a part of my daily routine. He did not spend even one minute discussing how I should go about establishing this new habit.

Safety briefings and movies on the importance of seat belts are often deficient in a similar manner. They demonstrate the problem and the solution; they offer arguments and counter-arguments; they motivate and urge. But no advice is offered regarding how a conscientious driver or passenger can make seat belt usage a consistent habit.

If you have decided seriously, not whimsically, that you would like to get into the habit of using a vehicle restraint device, i.e., lap belt and shoulder harness, here are six practical techniques for establishing this new habit.

tell others in advance

If you car pool to work or if other family members usually ride with you, announce a few days in advance that you plan to start wearing your restraint device regularly. By doing this, they will keep the pressure on and remind you should you forget.

make buckling up a specific step in your entry sequence

Over the years most people have developed a set routine for entering and starting their car. You may wish to attach your restraint device as soon as you are seated (safety experts recomment this approach) or after the engine has turned over. The important point is to be consistent. Let what seems most natural to you dictate the order of events. If you decide, for instance, that buckling up should be "Step Three" in your entry and starting sequence, make sure you follow this pattern consistently.

use it religiously, regardless of distance

I once observed a man who needed to re-park his car by driving it a mere 20 yards further down his driveway. To my amazement, he buckled up before putting the car in motion. His buckling up habit was so ingrained, it was automatic. Here was a man who, in another instance, would not rationalize non-usage by telling himself, "It's only a few blocks to the drugstore."

require usage of your children

If you have children, take them aside and seriously explain some of the life-saving reasons why seat belt usage is important. Then insist that they buckle up regularly. Not only will they practice

what you preach to them, but in the days and weeks ahead they will feed back to you word for word your own advice and insistence.

create a homemade cue card

During the first week or two when you are trying to establish your new habit, you may need the support of a cue card. Make a small sign which you can hang on the steering wheel as you are about to get out of your car. Even for drivers with the best intentions of forming the seat belt habit, this little reminder will prove helpful.

concentrate on the first two weeks

Concentrate your restraining efforts on the first two weeks. Make an all-out effort to employ all or most of the techniques and procedures noted above. Many of these procedures may seem artificial and unnecessary. However, if you make a conscious, concerted effort to establish this new habit during an initial period, the continued practice of this habit will be subconscious and automatic.

Taking two weeks to establish this important habit could very well add two decades to your life. Thirty-five percent of the unbuckled people who die in automobile accidents could have lived. Buckling up is a habit to live by.

Editor's Note: We don't know about Capt. Worthington's figure of 35%. There are all sorts of studies in existence on the effectiveness of belts, and though their figures differ, they all point up that belts *will* reduce your chances of dying or being injured in a car crash. So his point is well taken.

Here are a few of the studies:

1. Safety belt wearers sustained fewer and less serious injuries than non-wearers;

the proportion of occupants escaping injury altogether rose from 28 percent to 42 percent;

half of the injuries which did occur were reduced from severe to minor.

(Hobbs, 1978)

2. In both frontal and rollover collisions, belts:

increase the occupants' chances of having no injury;

reduce significantly both fatalities and serious injuries. **(Huelke, 1977)**

3. The overall lifesaving effectiveness of lap/shoulder belt combinations, *when worn*, is nearly 60 percent. Some estimates have been even higher.

(NHTSA/Tow-Away Study, 1976)

MAKE A HABIT OF WEARING SEAT BELTS

by Capt DOUGLAS K. WORTHINGTON
Youngstown Air Reserve Base, Ohio

4. Foreign nations with 70% usage have seen fatality/injury reductions of 10 to 20%. **(Robertson, 1978)**

5. Safety belts were 78% effective in reducing the number of serious injuries or fatalities and in those crashes studied represented a savings of 148 lives. **(State of Washington, 1974)**

6. For lap-belts alone,

lap belted occupants had a 73% lower fatality rate, a 53% lower serious-injury rate, and a 28% lower overall injury rate than nonrestrained occupants. **(Pennsylvania, 1974)**

lap-belts reduced the risk of being killed by 50%, of being more severely injured by 41%, and of being injured at all by 29%. **(Kihlberg, 1969)**

7. For lap and shoulder combinations, the average injury-reducing effect of the harness was between 40% and 90% depending on accident speed and type of injury. **(Bohlin, 1967)**

8. With only 25% of U.S. drivers using seat belts, 3,000 to 5,000 lives are being saved annually. If 80% of drivers used them, annually we would save 13,500 lives, and 1,260,000 injuries, and $12.6 billion in expenditures. **(NHTSA, 1976)**

9. After more than one billion miles of travel of VW Rabbits with passive belts, the fatality rate for these cars was .78 per hundred million vehicle miles of travel compared with 2.34 fatalities per hundred million vehicle miles in Rabbits equipped with conventional seat belts. **(NHTSA, 1978)**

tteecchh!!
DOUBLE TECH Q A

With TSgt RON LATHROP

I agree no cooling system should be without a good anti-freeze coolant for all the reasons you listed in the April 1979 DRIVER. However, if I remember my chemistry, plain water actually "cools" better than the mixtures of common anti-freeze. Right?

Only as long as it is in the radiator. Water is a better coolant, but if it has boiled out of the radiator it does you no good on the ground.

Most of today's anti-freezes are basically ethylene glycol. When added to water they raise the boiling point of the solution. At sea level, water boils at 212 degrees Fahrenheit. A solution of equal parts of water and anti-freeze boils at 227 degrees, while a solution of 66 percent ethylene glycol and 34 percent water will boil at 238 degrees. Further, the radiators are pressurized. A 15-pound-per-square-inch pressure will extend the boiling point another 38 degrees Fahrenheit.

If you want real confusion, consider that water freezes at 32 degrees Fahrenheit, while pure ethylene glycol freezes between 8 and 9 degrees below zero. Yet a solution of equal parts water and anti-freeze won't turn to ice until 34 degrees below zero. The ideal maximum mixture is 66 percent ethylene glycol and 34 percent water. The freezing point is then at 92 degrees below zero!

Although it's not a technical question, here goes anyway: It seems that we keep training two-wheelers to no avail because the four-wheelers still get us. When do we wise up and start training the four wheel drivers?

When did we stop? If nearly half of all motorcycle accidents weren't single-vehicle incidents you might have a good point. Additionally, as 77 percent of all the motorcycle disasters occur between 10 and 2 in the operator's clock of vision (see April '80 DRIVER backcover) the two-wheel operator must share the responsibility.

I look at it as a fundamental. It is easier to educate an individual who has something to gain from the training. In this case, the motorcycle operator always loses in a vehicle encounter of the worst kind. Therefore, it is the two-wheel rider who stands to gain by learning how to avoid problem situations. As motorcycles offer little threat to four-wheel operators, it's hard to convince them they have anything to gain. As a result, I think educating four-wheel operators would be next to impossible. (Nevertheless, the Air Force tries to do so through its multi-media traffic safety program and in fact has increased the emphasis on the driver's responsibility toward the cyclist.)

There is a simple additive black box that converts motorcycle turn signals into running lights to sole the problem in February's Double Tech. It is available from that automotive parts and accessories catalog that seems to float into mail boxes two or more times a year. Through use of transistors and resistors you can have brake lights, turn signals and driving lights. The only problem I see is whether or not amber lenses on the turn signals are acceptable as brake lights in all states.

Just goes to prove that I can't be everywhere at once. I have two problems with the system you detailed in your letter. The first is when the turn indicator is on and you apply the brakes. The condition is this: When you signal for a turn, the turn light flashes from 3 to 32 candlepower (cp), while the other two lights (brake and opposite turn signal) are shining at 3 cp. Now, when you apply the brakes, the opposite turn signal and the brake light brighten to 32 cp, while your turn signal is flashing from very dim to *just equal* to the others. That would be pretty confusing to anyone following you. It might look more like a malfunctioning light than a turn signal. My other problem is finding a source other than a company that is reorganizing under federal bankruptcy laws.

How do I break in a rebuilt engine?

Gently. Use smooth acceleration with absolutely no full throttle operation during the first 500 to 1,000 miles. Be especially careful when the engine is cold. After cruising at a steady speed for 20 minutes or so, accelerate 10 or 20 mph faster and then remove your foot from the gas pedal completely. This will pull engine oil past the piston rings and help them seat. It will also lubricate the upper end of the engine. Other than that, keep a watchful eye on the gauges and check all fluid levels regularly. Enjoy your vehicle's new lease on life.

Editor's note: Double Tech is a question and answer column in which DRIVER will attempt to make clear some of the cloudy subjects in readers' minds. Unlike other automotive magazine Q & A columns, Double Tech doesn't deal with specific questions such as, "Why is my Wink-Snoozymobile hard to start on rainy mornings?" Instead Double Tech fields questions that are of general interest to the majority of our readers. However, when sending questions to Double Tech be sure to include all available information because this will help in finding the correct solution. If you have a question you'd like an answer to, and you feel others could use the knowledge also, send it to:

Double Tech
DRIVER Magazine
HQ AFISC/SEDD
Norton AFB, CA 92409

As with most magazines, DRIVER has a long lead time between writing and publication, so don't be surprised if it takes several months to get a reply.

Timely Topics

MOPEDS SHOW GAIN IN STATE RECOGNITION

Mopeds—those two-wheel vehicles with an engine and pedals—are recognized legally in 44 states and the District of Columbia, according to the Moped Association of America.

About 94 percent of the population, dispersed throughout the 45 jurisdictions, now has specific laws defining and regulating the moped, and separating it from either the motorcycle or the bicycle.

The six states without moped laws are Alabama, Alaska, Idaho, Mississippi, Missouri, and Utah. All allow mopeds on roads if registered as motorcycles.

But Paul Zimmerman, executive director of MAA, said, "We expect that legislation granting the moped its own status will be introduced in the six states this year."

CRASH TESTS

The DOT recently tested 48 imported and domestic automobiles by duplicating the head-on collision of two cars of the same size traveling at 35 mph. Two adult "dummies" were belted into the front seat and a child dummy was in the rear. Damages were measured in four categories: Occupant protection; whether the windshield popped out; whether anything from the engine compartment or front end crashed through the windshield, and whether there was a fuel leak.

Only five of the 48 passed: Plymouth Horizon; Chevrolet Citation; Ford Mustang; Dodge Magnum and Chrysler Cordoba (same body).

Five popular foreign models were among the many cars failing the occupant protection test: Datsun 210, Volkswagen Rabbit, Honda Civic, Toyota Celica and Volvo 244DL.

WHICH WAY GADGET

Traffic jams cause the worst cases of nerves. But there may soon be a way around many of the frustrations. In Japan, the government is sponsoring a project to aid motorists in avoiding the worst of the jams. Displays on a series of test cars' dashboards tell a driver the best way to get to a destination, based on current traffic conditions, in a section of Tokyo. The driver punches in a destination on a keyboard and the gadget tells which way to turn when the car pulls up to an intersection, allowing the driver to avoid snarls. Traffic is monitored and information is constantly updated, then radioed to the destination-finding equipment mounted in the car.

UNIROYAL TO RECALL TWO MILLION TIRES

The Uniroyal Tire Co. will recall an estimated two million passenger car steel belted radial tires—the second largest tire recall in history.

The decision to recall came after the National Highway Traffic Safety Administration earlier made an initial determination that some tires made by Uniroyal contain a safety-related defect.

The Uniroyal recall covers over 1.3 million of the company's "Zeta 40 PR6" and "TPC PR6" tires, size LR78-15, produced in 1975 and 1976. Most of the recalled tires are TPC PR6s which were original equipment on some full-size 1975, 1976 and 1977 General Motors automobiles.

Owners of these original equipment tires will receive notification letters based on automobile registration records. Owners of the recalled replacement tires (those recalled tires which were not the first set of tires on an automobile) also should be receiving notification letters, if their tires were registered at the time they were purchased. It is not necessary to receive a notification letter in order to exchange the recalled tires for new ones.

The federal safety agency said those tires which were purchased on or after 1 Dec., 1976, will be replaced with a new tire, including mounting and balancing, at no charge to the customer. Recalled tires purchased prior to 1 Dec., 1976, will be replaced at half-price or based on a pro-rata share of treadwear, whichever is more favorable to the consumer. Federal law does not require free replacement of tires more than three years old.

The recall also includes:

- approximately 60,000 of Uniroyal's 1975 production of TPC PR6 tires in size BR78-13.
- approximately 75,000 of the 1977 production of Zeta 40 PR6 tires in size HR78-15.
- an estimated 400,000 of Uniroyal's 1975 and 1976 production of Zeta 40 PR5 and associated tires in sizes LR78-15 and HR78-15.

In addition to PR5 and PR6 tires, which are sold under the Uniroyal name, the company will recall private and allied brands manufactured by Uniroyal that are essentially the same tire as the company brands involved in the recall.

The private and allied brands include Diplomat Steel Belted Radial, Gillette Steel Belted Radial, Peerless Steel Belted Radial, Fisk Steel Belted Radial, Delta Radial II, Delta Victorian Radial and Radial II, Delta Durasteel Radial, K-Mart's KM Radial 40 and KM Radial SSK Steel Belted, Coop Mark 74 Steel Belted Radial and Mark X Steel Belted Radial, Sonic Steel Radial Dual Steel Belts, Exxon Steel Belted Radial 78, Traveller Radial Dual Steel Belt, and Big O Big Steel Radial II.

NHTSA estimates that one-third to one-half of the recalled tires still may be in service.

NEW GLASS FOR SUN ROOFS

Car companies are studying a new type of glass for sun roofs. The roof assembly consists of a half-roof made with a sliding panel of photochromic glass, the same kind used in sunglasses that automatically darken or lighten as required.

Says one engineer: "Now you can have shade in the daytime and watch the moon and stars at night—without the mosquitoes."

ACCIDENTS AND LITERACY

A correlation between accident rates and literacy skills has been established in a recent study by the University of North Carolina's Highway Safety Research Center. In a presentation to the Society of Automotive Engineers at the annual convention in Detroit, Dr. Patricia F. Waller, HSRC's associate director of driver studies, reported that the research involved 26,000 drivers. Approximately 13,000 took the written driver's license exam while the other half took the oral test because of inadequate reading skills. The drivers who took the oral exam had 24 percent more accidents in which they were at fault and 17 percent more in which they were not at fault. Waller said that literacy might not be the direct cause. Other factors like socioeconomic class might be stronger determinants. However, she concluded that driving does require some literacy skills since much information is related through signs.

This research appears to DRIVER to be a solid boost for the conversion to international signs which have no words to read!

DRIVER

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FOR THE MILITARY DRIVER

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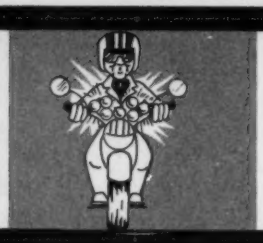
LETTERS to the EDITOR — BACKfire



RUNNING LIGHTS

Just finished reading the February issue of DRIVER, which was outstanding as usual.

Reference your article page 13, regarding installation of running lights. I personally have not owned a motorcycle; however, my brother has and had a similar problem. He installed his running lights (the kind sold commercially for autos) on his crash bars. He attached and wired them in such a manner that when he turned his headlight on, the running lights came on at the same time. You sure couldn't miss seeing him coming down the highway. They seem to work great without bothering other autos/bikes on the road.

By the way, they looked *kinda neat* too!

SSgt Herman H. Heierman, USAF
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SNOWBALLED?

I just happened to pick up a back issue of DRIVER (Oct '79) and started reading the first article, "Snowy Weather Driving; Preparing for Winter."

I found the article very informative and helpful. Except for the following statement in the introduction: " . . . That's bad enough. But how about the types who accelerate to the legal speed limit on icy roads and then expect their brakes to stop them safely in a short distance? Especially those who have lived in wintry climates for years—are they dense or do they just not think?"

I would like to know where the author of this story lives. I would also like to know who he thinks he is calling "people who live in wintry climates for years," dense.

One thing I do know is that he'd better stay away from my hometown or he'll be "snowballed" all the way back to where he came from. (That's not a threat; it's just the probable outcome.)

I'm originally from Pennsylvania, where driving in snow is a yearly occurrence. We learn to drive safely and cautiously in snowy conditions from very qualified instructors.

Now I'm stationed in Virginia, and *these* people are the ones who need lessons for driving in snow. They get one or two snowfalls a year, then go out and drive like "that little bit of white stuff on the road couldn't possibly give *me* any trouble." Then, later that day the tow trucks are working around the clock pulling these "I didn't think it was that slippery" people out of snow banks.

I do hope this letter makes it to the desk of the author who wrote this article. I'd like to inform him that people who live in wintry climates for years are NOT dense, and people who publish such prejudiced statements as this definitely ARE!

Jack E. Rebert, Jr.
11409 Winston Pl, Apt. 1
Newport News, VA 23601

Your letter got on the author's desk first thing. Ruined his morning. You see, until he came to work at DRIVER a couple of years ago, he lived (and drove) in Colorado, where it's been known to snow a lot.

Herewith, his response to you: "I was not calling all the people in wintry climates 'dense.' I lived in one myself most of my life. I was talking about people who drive fast on icy roads. It would be one thing if it were only tourists who do that. But you and I both know the hot-shoes are very often the same people who live in one's own town. A tourist from the sun belt might have an excuse for driving like that—he may not know any better. But 'those who have lived

in wintry climates for years' don't have that same excuse. If they drive like that, they are indeed dense or not thinking.''

Now, the next problem is what are we going to do with all those letters that will be coming in from angry folks in Virginia who don't think they need driving lessons? Guess we'll just put those on Rood's desk, too. After all, he started all this.

GASOLINE USE

I would like to respond to one of your recent articles. In your February Double Clutch column you responded to a handful of letters against articles on racing. Personally I agree with your policy of publishing those articles. My disagreement is with your last paragraph cop-out of ''what about boats and planes?''

I cannot address private aircraft and I don't use commercial aircraft, I have no accurate figures. However, the following information regarding boating may be of interest to you and your readers, many of whom own boats as you will see.

According to the National Marine Manufacturers Association (NMMA) there are approximately 11,625,000 pleasure boats on American waters. Of these 8,034,905 are registered. Approximately 1,134,000 are registered as inboards (includes stern drives), while 6,352,000 are registered as outboards. Another 904,000 are sailboats without auxiliary power. The remainder are unregistered due to differing state regulations regarding size or horsepower.

Approximately 58,000,000 people went boating two or more times in 1979.

With those figures in mind consider the United States Coast Guard estimate that the consumption of fuel by *all boats in one year* is less than 0.5% of the oil used in the country. Most ''boating'' consists of a short run to a favorite fishing hole, several turns around a lake or harbor with a skier, and then dropping the hook for a little swimming, picnicking and general laying around.

To single out boating is neither rational nor accurate.

In summary, and in answer to your question, ''How much fuel could be saved if Americans curtailed recreational boating?'', a 5/1,000ths drop in the proverbial bucket!

Ens Michael W. McFadden, USN
USS Hewitt DD-966
FPO San Francisco 96601

Our mail is running about 50-50, from boaters and private (recreational) pilots. Remember, we have to count the gasoline used driving to where the plane or boat is, or hauling the boat to the water.

Seriously, we could have done better in that February column by pointing out that it is needless trips in the car that waste most fuel. The Department of Energy estimates 12⅛ billion gallons is used annually for ''shopping.'' Think what we could save if we went to the grocery store once every two weeks and combined other errands with the trip.

ROCKY/BUMPY ROADS

We recently completed a several thousand mile trip by auto from San Antonio, Texas to Anchorage, Alaska. For the most part the journey was on good, paved roads in the U.S. and Canada. However, we encountered a several hundred mile stretch of unpaved road when reaching the Alaska Highway about 40 miles north of Haines, Alaska.

That portion of the road from Haines, Alaska to Haines Junction, Yukon Territory had been reconstructed during the summer and was reasonably smooth but quite dusty with several large rocks. Immediately after leaving the pavement at the Canadian border we heard and felt a large ''thump'' but thought it was only a chuckhole or rock which had bounced off the car somewhere. We did not stop to investigate.

Upon reaching Haines Junciton we gassed up and as a precaution against closed stations further down the road, I looked under the hood. You can imagine the shock we had when I discovered a pool of red liquid rapidly forming under the car. We had knocked a hole in the transmission pan about 120 miles back. For reasons unknown, very little fluid leaked until we stopped. We limped to a nearby service station and expected a large repair bill and perhaps a layover and/or a trip back to Whitehorse for parts. Luckily for us the station operator was able to braze the hole closed, loaned us his pickup to get lunch while he repaired our car and charged us only $26 ($15 for labor and the rest for transmission fluid). After filling the transmission we took the car through several gear changes and it performed all right.

The rest of the trip was uneventful in terms of mishaps, except for a broken headlight. We did have to get the transmission adjusted and have the pan replaced once we reached Anchorage.

To end a long story, I would urge anyone traveling the Alaska Highway or similar roads to be alert for strange ''thumps,'' especially on very rocky parts of the road. Carry spare fluids (when not flammable) and stop and check if you think you might have encountered damage. We were lucky this time. . . .

MSgt Stephen J. Spear, USAF
240F Firesved
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BRIDGE
Most cars float a minute or two, remain upright.
Exit quickly through windows, sun roof or rear hatch—not doors.
Car sinks toward engine.
Air bubble forms under car roof but may move temporarily into trunk.
If doors are jammed, shatter a window.
When water rises above doors inside car, you may find them easy to open for quick escape.
Turn on headlights or flashers to aid rescuers.
Kelleher
what do you do NOW?